Castilleja linariifolia

Castilleja

Publication of the Wyoming Native Plant Society

May 2021, Volume 40(2)

Posted at www.wynps.org

How is Laramie chickensage (*Artemisia simplex*) pollinated?[1]

By Madison Crawford[2,3], Joy Handley[3] and Lusha Tronstad[3]

Pollination is an essential process that increases the genetic diversity of plants, allowing them to maintain healthy populations. For many flowering plant species, pollination mechanisms have been well-studied and range from completely animal pollinated or wind pollinated, to a combination of both. When mature flowers are pollinated, they usually produce viable seeds and grow into plants that feed numerous insects, reptiles, birds, and mammals. How do we know if plants are wind or animal pollinated? Animal pollinated plants typically grow in a variety of ecosystems and produce large, showy blooms and small amounts of rough pollen (Culley, Weller, and Sakai 2002). In contrast, wind pollinated plants typically occur in windy ecosystems, have small flower blooms and produce large amounts of smooth, small pollen grains. For example, Prickly pear cactus (*Opuntia* sp.) produces large, colorful flowers and is well-known to be pollinated by Megachilid bees. On the other hand, Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) has small, inconspicuous flowers and is wind pollinated.

The pollination mechanism and reproductive success of rare or endemic plants is much less well-known compared to plants that are common and widespread (Gibson et al. 2006). Rare and endemic plant species provide nutrition to a variety of animals (Schowalter 2016), increase insect diversity (Hernández-Teixidor et al. 2020), and contribute to the functional diversity within an ecosystem (Flather and Sieg 2007). A plant is described as rare when its abundance or frequency is low, and a plant is endemic when the species only grows in a specific location (e.g., may be endemic to a US state or to the entirety of North America). Studying how rare or endemic plants are pollinated can help manage these species so they persist into the future. Moreover, rare plants are often pollinated by rare pollinators (Bosch et al. 2009), so investigating pollination can reveal new information about the persistence of both pollinators and plants.

Figure 1 (left): Laramie chickensage (*Artemisia simplex*), photo by Madison Crawford

Laramie chickensage (*Artemisia simplex*) in Figure 1 is a member of the sagebrush genus and is rare and endemic to the foothills of the Laramie Range, Shirley Basin, and Shirley Mountains of southeastern Wyoming. Not much is known about the reproduction and pollination of this plant, perhaps due to its small range. (Cont. p. 6)

In this issue

How is Laramie chickensage pollinated?. 1, 6
2021 WYNPS Annual Meeting Registration . . . 3, 4
White fir discovered in the Wind River Range . 5, 6
Twenty MORE Years of WYNPS! 7-9
Growing Native Plants:
Forbs for Moist, Partly Shaded Sites 10, 11
Whitebark pine conference 12

[1] Laramie chickensage (*Artemisia simplex*) was a hot topic in the first issue of the Wyoming Native Plant Society in 1981 under the synonym Laramie False Sagebrush (*Sphaeromeria simplex*). Forty years later….there's more to learn!

[2] Dept of Zoology and Physiology, Univ. of Wyoming
[3] Wyoming Natural Diversity Database, Univ. of Wyoming

WYNPS News

2021 Annual Meeting, June 25-27 in Laramie: Everything you need to know about the 2021 Annual Meeting is in this issue. Look for the insert with the itinerary, registration form and weekend hike descriptions. You can also register at www.wynps.org; it helps organizers to know response ahead of time. All 2021 WYNPS events are open to family, friends and the general public. All events are outdoors, except staggered tours at Rocky Mountain Herbarium. Please come if you can!

New Members: Please welcome the following new members to WYNPS: Leslie Ballinger, Woodside CA; Carolyn Carothers, Moran; Catherine Jean, Ennis MT; Melanie Koenigshoff, Kamen, Germany; Amy Mayfield, Santa Barbara, CA; Gregory Pappas, Laramie.

2021 Markow Scholarship: This year's Scholarship recipient is Bridger Huhn, PhD student at UW Dept of Botany. Bridger is interested in the adaptations of endemic plants. For this project he will be studying one of the most restricted Wyoming plants, Desert yellowhead (*Yermo xanthocephalus*). He will test the hypothesis that it has access to water and nutrients unavailable to its competitors, enabling it to specialize in a stressful environment. Congratulations, Bridger!

June 20 Bitterroot Hike in Dubois:
Join Dubois' favorite locals, Meredith Taylor and Lynn Stewart, for a wildflower hike in the East Fork area of Fremont County, jointly hosted by the National Bighorn Sheep Center and WYNPS. We hope phenology cooperates for a stunning display of bitterroot, but we may also have opportunities to check out blazing star, Prince's plume, indian paintbrush, and others! This fairly easy uphill hike will reach an elevation of about 8,000′. Please bring your lunch, water, sun protection, bug spray, and bear spray.
Time and Place: Caravan will begin from the National Bighorn Sheep Center, 10 Bighorn Lane, Dubois at 10AM. Alternatively, participants can meet the caravan at the East Fork Road turnoff of Hwy 26/287 10 miles east of Dubois, shortly after 10 am. From there we will caravan to the hike location on the East Fork. The hike will begin at 11 am and go until approximately 1 pm.
Registration: This hike is free, but registration is required. Hike is open to members of WYNPS or the National Bighorn Sheep Center. Please email info@bighorn to register and for more details.

Message from the President

Greetings!

As I write this, snow has been falling for five days straight in Lander, and with each day, I can't help but think it means better and better things for this year's wildflower display. Meanwhile back in Laramie, the planning committee has been hard at work on details for the WYNPS Annual Meeting, June 25-27. They've set up a fantastic itinerary of plant hikes and talks with interesting trip leaders and some exciting endemics. Unique to this year's event, we'll have tours of the Rocky Mountain Herbarium on the UW campus, the home of the largest collection of Rocky Mountain plant specimens on the planet. Whether you're a seasoned botanist whose contributions helped make the RM what it is, or a beginner wondering what over 1 million pressed and mounted plant specimens actually looks like, I hope you can join us.

This year we are celebrating the **40th anniversary of WYNPS**. Stories from founding members about how the Society got started, in the previous issue, are real treasures! In this issue we recognize all founding members, as recorded in the first 4 issues of our newsletter, while we take another look back…and forward.

See you in June!

Emma Freeland

Contributors to this Issue: Madison Crawford, Robert Dorn, Emma Freeland, Bonnie Heidel, Dorothy Tuthill.

Treasurer's Report: Balance as of April 15: Scholarship = $963; General = $8936; Total = $9454

2021 WYNPS Annual Meeting Registration Form

This event is open to the public; membership in the Society is not required. However, registration is required to attend. Please register by June 10, 2021 to help us prepare, by mail or online. No dogs, please, on any of the hikes.

Registration fee is $10/person.

Name(s) _____

Address _____

Email _____

For how many people are you registering? _____ Which days do you plan to attend? Please circle.

Friday Saturday Sunday

Group camping

Hidden Valley is a group camp site, consisting of a large open area surrounded by forest, picnic tables, and a pit toilet. There is a fairly large parking area for cars and campers (no buses, please). There are no individual camp sites, but a large open area surrounded with trees where tents can be pitched. WYNPS has reserved the site for Friday and Saturday nights. There is no cost to camp here. This location will also be the site for the Friday evening hike and the Saturday evening dinner and program.

Do you plan to camp at Hidden Valley? _____

If yes, for which nights? Friday only Saturday only Both Friday and Saturday

If yes, are you planning to bring a tent or a camper? _____

Please circle your preferred trips:

Saturday: Snowy Range all day trip Friend Park all day trip

Sunday am: McGuire Ranch morning trip Red Buttes morning trip

Sunday pm: Pole Mountain wetlands afternoon trip Red Buttes afternoon trip

Registration fee: $10/person ($5 for kids 12 and younger)

_____

Saturday evening catered dinner (Turtlerock deluxe sandwiches; plus desert by local members):

$9/person _____ Meat _____ Vegetarian

Total amount enclosed:_____

Please mail form and check to Wyoming Native Plant Society, P.O. Box 2449, Laramie, WY 82073

The RM Open House is the only indoor event – UW requires mask use as of this posting. Go online to the www.wynps.org to see our covid19 precautions. There, you will also find a map with directions to Hidden Valley. Members are welcome to register online instead of by mail.

WYNPS 2021 Annual Meeting Schedule

Friday, June 25

3-6 pm: Registration and check-in at the Rocky Mountain Herbarium (RM), Univ. of Wyoming.

3-6 pm: Rocky Mountain Herbarium Open House
Join Curator Ernie Nelson and other herbarium staff for a tour of the RM, the largest repository of Rocky Mountain plants in the world! Parking near campus can be difficult. *Campus lots are available after 4:30 pm only. Street parking is available, but watch for City Permit Only signs on some blocks—the fines for parking there before 5 pm can be quite hefty.*

[6-7:30 pm: Dinner on your own]

6:30-7:30 pm: Registration/check-in at Hidden Valley

7:30 pm: Headquarters Trail sunset hike
We will leave from Hidden Valley Campground for a leisurely walk along Forest Service trails, to explore the flora and landscape of the Laramie Range. Hike leaders: Katie Haynes and Greg Pappas.

Saturday, June 26 – These are all-day hikes. Bring a lunch and plenty of water!

6:30-7:30 am: Registration/check-in at Hidden Valley

8:00 am: Trips 1 & 2 will leave at 8 am from the north end of the Safeway parking lot. Safeway is located at 554 N. 3rd St, just north of downtown. The lot extends to the north, past Planet Fitness to the empty store that used to be Kmart, where we will congregate. Cars can be left there for the day; we encourage carpooling as much as possible. *Note that parking/use fees are required at some of our destinations - both Saturday hikes and one of the Sunday hikes - please bring your public land pass, if you have one.*

Trip 1: Snowy Range
Trip leader: Ernie Nelson, Rocky Mountain Herbarium. This all day trip will take us to the high subalpine of the Medicine Bow Mountains. Here we will look at plants at the alpine-subalpine ecotone. We will also explore the northern part of the Southern Rocky Mountain flora. There will be hiking at high elevation (10,600-10,900 ft.). Be sure to bring a jacket!

Trip 2: Friend Park
Trip leader: Katie Haynes, Medicine Bow NF
This all day excursion will take us north the Laramie Range near Friend Park where we will explore rock outcrops looking for Laramie columbine (*Aquilegia laramiensis*), a state endemic of the Laramie Range. Our travels will take us on many miles of gravel roads and across remote terrain, expect a 2.5 hour trip each way. There may be several miles of walking during the day, with some light rock scrambling for the

6 pm: Catered Dinner at Hidden Valley Campground.

7 pm: 40 Anniversary Program at Hidden Valley
Recognition of WYNPS charter members, and Hartman award recipient Jennifer Whipple.
Speaker: Dr. Brent Ewers, UW Professor of Botany, "A biophysical view of Wyoming native plant distribution and productivity." He will give insights on forests recovering from bark beetle and fire, sagebrush responding to drought, and biophysical limits to endemic plant distributions.

Sunday, June 27

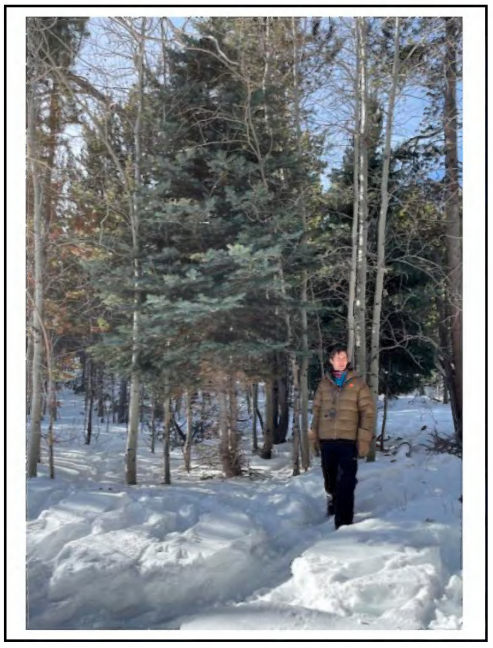
7-8 am: WYNPS business meeting at Hidden Valley. Continental Breakfast will be provided.

Trips 3 and 4 (both) will leave at **8:30 and 1:30** from the north end of the Safeway parking lot. Trip 5 will meet at Hidden Valley

Trip 3 (am): McGuire Ranch
Trip leaders: Trip leaders: Joy Handley and Madison Crawford, Wyoming Natural Diversity Database
This venue is an example of typical southeastern Wyoming high plains. Or is it? In this grassland we may find a typical summer show including *Penstemon radicosus* (matroot penstemon), but the calcareous outcrops give refuge to a local Wyoming endemic: *Artemisia* [*Sphaeromeria*] *simplex* (Laramie chickensage). This low growing forb was discovered by Aven Nelson in 1898 and it has some mysteries that graduate student Madi Crawford is trying to decipher. Is it wind pollinated, as are most of the members of *Artemisia*? Or do its showy flowers attract insect pollinators? Perhaps both?

Trip 4 (offered in both am and pm): Red Buttes Environmental Biology Lab (Univ. of Wyoming)
Trip leaders: Bonnie Heidel (am); (pm) Dorothy Tuthill Late June is the best time to see an amazing show of wetland plants (tobacco root, shooting stars, gentians, pale blue-eyed grass) and rare plants. This is an easy hike of less than a mile on gentle terrain. Hiking boots will do but you might prefer rubber boots or old tennis shoes for crossing wet ground.

Trip 5 (pm): Pole Mountain Wetlands – afternoon hike leaving Hidden Valley Campground at 1:30 pm
Trip Leader: Greg Pappas, Medicine Bow NF
This hike will explore the unique vegetation of Pole Mountain wetlands, including streamside, beaver pond, and fen/peat habitats. It will feature several rare species, such as a willow found only on Pole Mountain in Wyoming (*Salix serissima*) and the aquatic herb, *Utricularia minor*, a carnivorous plant!



Left:
Kurt Imhoff, Lander, stands to the right of white fir (*Abies concolor*). He went hunting hare and also bagged a fir record this past winter, photo by Emma Freeland

White Fir (*Abies concolor*): Addition to the Flora of the Wind River Range

By Emma Freeland

In early February of this year I received an inquiry from a geologist friend of mine, Kurt Imhoff, about a potential interesting botanical find in the South Pass area of Fremont County. Kurt had found what he believed was a white fir (*Abies concolor*) while hunting snowshoe hare, and was looking for a botanist to help him verify the identification. Aware that the only true fir documented in our part of the state is subalpine fir (*A. lasiocarpa*) I met this observation with a mix of curiosity and skepticism. White fir has a conservation rank of S1, G5, meaning that within Wyoming it is critically imperiled, although throughout its range it is considered secure. The Wyoming Natural Diversity Database (WYNDD) website and the Rocky Mountain Herbarium specimen database confirmed that naturally occurring white fir is only documented in two locations in the state: Little Mountain in Sweetwater County and the Uinta Mountains in Uinta County, both within a stone's throw of Wyoming's southern border. The location Kurt told me about in Fremont County was roughly 100 miles north of the Little Mountain white fir population. Regardless of what this tree turned out to be, the prospect of doing some floristic work this time of year sounded like a relief to my winter doldrums, and I agreed to go check it out.

On a bluebird Saturday morning we post-holed in to the site, located in an aspen-dominated swale in a lodgepole pine forest on BLM lands at an elevation of around 8,400 feet. When Kurt pointed out the potential white fir, it immediately stood out as different due to the glaucous cast on the leaves which gave the tree a bluish appearance uncharacteristic of subalpine fir. We searched a small area within the swale for other individuals, and found four total, ranging in size and age class from sapling to small but mature, with the tallest tree standing approximately 25 feet. We collected a voucher in triplicate (Kurt's first numbered collection, my first February collection), and I brought the specimens back to the office. A key characteristic that differentiates white fir from subalpine is the location of the resin glands as viewed in a leaf cross section. In white fir, the resin glands are located just under the leaf margin, whereas in subalpine fir, the resin glands are located midway between the midvein and the leaf margin. Under a microscope it was clear as day that the resin glands were directly below the leaf margin, as in white fir. After comparing with a subalpine fir specimen, ruling out other fir species from the Rocky Mountains, and taking into consideration additional leaf morphological characters, I was positive this was indeed white fir. This impressive observation from a geologist constituted an addition to the flora of Fremont County, and an addition to the flora of the Wind River Range.

There are so many unanswered questions about this population. For me the most obvious questions is how many more are out there? The fact that the species hasn't been documented in this area prior suggests there may not be too many. On the other hand, these white fir trees could be easily overlooked. We have tendency to fit the plants we see into a framework of "species possible for our area" and rule out those that we think "just don't grow here." So many floristic surprises are missed this way, by assuming we know everything that is out there. Despite the number of people who may have traveled by these white fir trees, how many would even know how to tell a true fir from a Douglas fir, or take the time to identify a true fir down to species? These white fir trees have been hiding in plain sight for at least decades; how many more are out there?

Another question is how did these white fir trees get here? South Pass is arguably the easiest place on the continent to cross the Rockies, and the combination of gentle topography and access to water has funneled east-west travelers through the area for millennia. Perhaps humans introduced white fir here, intentionally or unintentionally over the years. White fir is grown ornamentally, and it is possible someone planted a white fir or several, and they began to reproduce from there. If the oldest of these particular trees were planted, it would be an odd place to plant them. They

are not close to any homesteads or directly adjacent to any obvious travel corridors. The trees are randomly distributed within the unique microsite of the swale, giving an impression of them occurring naturally there. The presence of a sapling and apparent different ages of mature trees we saw indicates that the population is reproducing currently in the wild, and therefore warrants floristic documentation regardless of its origin. Given everything we know, the possibility of this being a naturally occurring disjunct population seems equally likely to me as the possibility these were introduced.

We can't begin to answer these questions until the local range and age class of the population is better understood. Tree ring cores, systematic survey, and a local awareness of this species that may lead to more observations are three strategies for beginning to scratch the surface of this white fir mystery.

Artemisia simplex; continued from p. 1

However, unlike most other sagebrush species, *Artemisia simplex* produces a fairly large, showy flowerhead that generated my main research question: is *A. simplex* animal pollinated instead of wind pollinated? To better understand this Wyoming endemic plant, we investigated the reproductive success and pollination of *A. simplex*. A plant successfully reproduces when it produces a viable seed that develops into a new individual. To estimate how well *A. simplex* produces seeds, we performed seed-set experiments on five *A. simplex* populations. Seed-set experiments test reproduction success by examining how well a plant produces seeds under normal, animal-pollinated, wind pollinated, and self-pollinated conditions. For example, we measured how well *A. simplex* self-pollinates its own flowers by placing a tightly woven fabric bag over one flower head to restrict any outside pollen sources. Similarly, we estimated the wind pollination potential of *A. simplex* by placing a loosely woven mesh bag over another head (we excluded pollinators). We left other flowers open to wind and animal pollination to measure seed production under normal conditions. Finally, we estimated how well *A. simplex* produced seeds under optimal conditions by hand-pollinating a flower to provide excess amounts of pollen. Most seeds that *A. simplex* produced were viable seeds under normal conditions, but this species produces very few seeds through self-pollinating itself (Fig. 2).

To further test the pollination mechanisms of *A. simplex*, we examined floral visual clues. We estimated floral and pollen characteristics of *A. simplex* and compared them to wind and animal pollinated plants. We found that *A. simplex* has a combination of wind and animal pollination characteristics. The floral anatomy of *A. simplex* suggests that this plant is animal pollinated with its large, yellow flower head that is likely attractive to pollinating insects. Furthermore, *A. simplex* produces pollen grains that are bigger and rougher than other herbaceous sagebrush species. *Artemisia simplex*

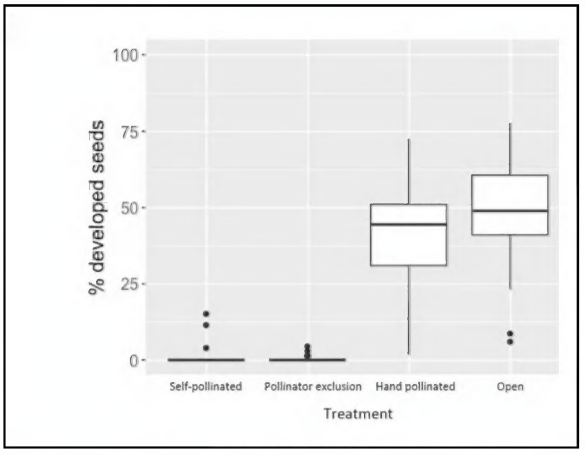


Figure 2 (above). Pollination treatment responses of *Artemisia simplex*

pollen is likely rough so that pollen grains may easily attach themselves to fuzzy pollinators. Because pollen grains are most often collected and transported by bees, we examined the pollen loads of native Wyoming bees to see if any insects were carrying *A. simplex* pollen. Bees accumulate pollen on their entire bodies, but actively store grains within the hairs of their back legs. As a result, we collected pollen loads from the hind legs of 7 bee genera. To accurately identify these pollen grains, we treated the grains by to remove carbohydrates, lipids, and proteins from the surface of the pollen grains. Once these layers were removed, patterns and ornamentations unique to specific plant genera were more easily observed. We found that *A. simplex* pollen was sometimes carried by small sweat bees (*Lasioglossum sp*) and mason bees (*Osmia* sp.). While we have evidence that suggests some bees carry *A. simplex* pollen, we will collect aerial pollen this summer to estimate whether *A. simplex* uses the wind to some degree to spread pollen grains. Results from our study will provide information on the reproduction and pollination mechanisms of *A. simplex*, creating baseline knowledge for this plant's life history. Our study will help managers make decisions in protecting this endemic Wyoming plant.

(*Madison Crawford is 2020 Markow Scholarship recipient.*)

Twenty *MORE* years of Wyoming Botany and the Wyoming Native Plant Society

By Bonnie Heidel

Forty years ago this month, the first edition of the Wyoming Native Plant Society Newsletter arrived in the hands of two dozen charter Society members. Twenty years ago this month, the 20th Anniversary Issue of the newsletter heralded an anniversary landmark - our first two decades. We now have twice as many years to celebrate! The Society newsletter has chronicled the history and dissemination of information to botanists and the greater community of native plant enthusiasts. What follows is a year-by-year recount that picks up where we left off, ca. May of 2001. *Please note: This isn't complete without YOUR timeline connections.*

2001 Dick Cheney takes office as the 46th Vice President of the United States. It is a tumultuous year due to 9/11. The flagship Wyoming botany publication of 2001 is: ***Vascular Plants of Wyoming***, 3rd ed., by Robert D. Dorn. It was published in the second half of the year, too late for the Society highlights of the first 20 years that ran 1981 through early 2001 (http://www.wynps.org/newsletters/2001_05.pdf). Newsletter editor Walt Fertig turns over the reins; more tumult.

2002 Society partners with others to co-host 2002 Biological Diversity of Sagebrush Landscapes, a technical conference, a workshop on *Artemisia* taxonomy by Al Winward and Roger Rosentreter, and a rare plant workshop; in Laramie, March 19-21. Desert yellowhead (*Yermo xanthocephalus*) is listed as Threatened. Starting in 2001, Dorn spends next few years trying to explain taxonomic upheavals to Society audience with such candid newsletter accounts as "Greasewood expelled from Chenopodiaceae", "What happened to the Lilies?" , …and later in 2003: "Asters Retreat to Eurasia".

2003 Dave Freudenthal takes office as the thirty-first Governor of State of Wyoming. A shared alpine wonderland, the Line Creek Plateau Research Natural Area (RNA), is dedicated in the Beartooth Mountains area that lies in both Montana and adjoining Wyoming. Fertig publishes "Confessions of a Moonwort Stalker," foundation for an unfolding saga of discovery later to culminate in Wyoming's recognition as moonwort capitol of the Rockies. Also: Linnaeus starts a taxonomic self-help column in the newsletter.

2004 The flagship Wyoming botany publication of 2003 is finally reviewed in 2004: **Region of Astonishing Beauty**, a chronicle of early botanical exploration in the Rocky Mountains, by Roger L. Williams. Plus, a flagship Wyoming botany publication of 2004 is reviewed in the correct year: **Wildflowers of Wyoming** by Diantha States and Jack States. A vagrant lichen, *Xanthoparmelia chlorochroa*, makes statewide headlines and is charged in elk deaths.

2005 Society members catch the moonwort action on a merry day in May at the 2005 Annual Meeting in the Black Hills National Forest, joined by Dr. Moonwort (Donald Farrar) and Forest botanists. Kin to the Wyoming State Flower are incriminated in aiding and abetting a pathogen (Alternate Hosts of Whitebark Pine Blister rust).

2006 More backstories behind Wyoming paintbrush (*Castilleja linariifolia*) as the Wyoming State Flower and Society mascot come out in the open. The Society publically corrects the Wyoming Tourism Department statement re. our state's paucity of mosses (bryophytes). "Glacial hangovers" are revealed in the fen flora, and basin cushion plants show their affinity to alpine cushion plants in our well-cushioned flora.

2007 Society partners with others to co-host 2007 Wyoming Plant Conference, a technical conference plus technical workshops on peatlands and moonworts, by Dave Cooper and Don Farrar, respectively, in Laramie, March 20-21. The flagship Wyoming botany publication of 2007 is: **Growing Native Plants of the Rocky Mountain Area** by Robert and Jane Dorn. The Wyoming State Tree and State Grass get some press time. So does a widespread disease that went by the name "Plant Blindness," as does some botanical low-life: a notorious diatom with its own nickname.

2008 Financial crisis of 2008 destabilizes global economy. U.S. Forest Service institutes a native plants policy to prioritize use of native species in all restoration work to stabilize disturbed landscapes. The additions to the Wyoming flora reported in 2008 are all non-native species…usually it is the other way around. The Bureau of Land Management designates an Area of Critical Environmental Concern for Wyoming's only Endangered plant, *Penstemon haydenii* (Blowout penstemon) in 2008; not reported in newsletter until 2009.

2009 Wyoming's place at biogeographic crossroads is highlighted in announcing discoveries of arctic and subtropic species in the state flora, in the same issue (not from the same place). The specimen database of Rocky Mountain Herbarium (RM) with scanned images goes online – yippee! Emily and

Brian Elliott herald moonwort discoveries in Absaroka, Beartooth and Gallatin Range inventories (more for Montana than Wyoming, alas). Big Sagebrush inflorescences are touted as photosynthetic powerhouse – putting new meaning to the term "flower power".

2010 The United States Census reports the State of Wyoming population at 563,626, an increase of 14.1% since the 2000 United States Census. The flagship Wyoming botany publication of 2010 is: ***Vascular Plants of the Greater Yellowstone Area: Annotated Catalog and Atlas***, by Erwin Evert. The Berry Biodiversity Conservation Center opens its doors and shortly afterward, a Biodiversity Institute is born at the University of Wyoming. The Society gains a web presence to post events and newsletters at your fingertips, with help of Walt Fertig in his preparing electronic newsletter files. Lifetime membership is created as a new Society membership category and email notification becomes an option for getting the newsletter. …A second flagship botany publication comes out in the same year: **A Field Guide to Wyoming Grasses,** by Quentin Skinner.

2011 Matt Mead takes office as the thirty-second Governor of State of Wyoming. A third flagship Wyoming botany publication of 2010, is reviewed in 2011: ***Wildflowers of Star Valley and the Tri-Basin Country***, by Orval C. Harrison. Robert Dorn launches his giftedly green thumb newsletter series on *Growing Native Plants*. The petition-findings of the U.S. Fish and Wildlife Service under the Endangered Species Act deem both whitebark pine (*Pinus albicaulis*) and Fremont rockcress (aka small rockcress; *Boechera pusilla*) as eligible. Membership votes to increase scholarship amounts and to also provide small grants that promote Society mission. Society celebrates 30th Anniversary in Big Horn Mountains.

2012 In June, the Society holds a joint annual meeting with American Penstemon Society, indulging all penstomaniacs in fieldtrips across the "greater-Laramie area" (within 150 mi radius). The Society establishes its current homepage address. Regretably, this was when we curtail use of our "wnps" acronym because the corresponding url was already claimed by another W- state (Washington). So to keep our acronym and new url consistent, we went to "wynps" – wy not?!

2013 The Beartooth Mountains beckon to Annual Meeting faithful. The Botany Department at University of Wyoming hits peak faculty numbers (19)! The Board raises Society membership dues for the third time in Society history. The 40th anniversary of the Endangered Species Act is marked by a roster of "the ones that got away" - 99 Wyoming plant species that underwent review but not listing as Threatened or Endangered.

2014 The flagship Wyoming botany publication of the year is: ***Mountains and Plains***, 2nd edition, by Dennis Knight, George Jones, William Reiners and William Romme. Red Canyon is destination for the Society holding the 2014 Annual Meeting in tandem with the Wyoming Bioblitz as organized by Audubon Rockies and Biodiversity Institute. A new Sublette Chapter forms - hurray! The botanical excitement of plunging into Yellowstone aquatics is told in an article and additions to the Wyoming flora reflecting the work of a father-son team, Barre and Eric Hellquist.

2015 Society holds first joint annual meeting with an adjoining Native Plant Society – co-hosting "Two Sides of the Tetons" with Idaho Native Plant Society. Also, the Society launches a new award recognizing contributions to Wyoming botany, starting with Ronald B. Hartman, and naming the award in his honor. Aven Nelson's 1899 adventures of conducting botanical survey in Yellowstone National Park are reconstructed in gripping article by Hollis Marriott.

2016 Hulett students successfully lobby State Legislature to designate Wyoming Big Sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) as State Shrub. Society hosts a gala gathering in Dubois with outings that radiate in all directions as part of the 2016 Annual Meeting. National Park contributions to the Wyoming flora are highlighted, featuring 41 Species of Concern found only on NPS land but nowhere else in the state.

2017 UW Cowboys Football Team makes it to the Famous Idaho Potato Bowl. Society newsletter achieves electronic immortality in a growing body of biodiversity literature compiled by the "Biodiversity Heritage Library" (BHL) of the Smithsonian Institution with technical support of a BHL-conversant member. Two new annual invasive grasses are documented in the state flora: medusahead (*Taeniatherum caput-medusae*) and North Africa grass (*Ventenata dubia*). Both are designated as noxious weeds in one or more other states.

2018 In the waning days of the State Legislature, the House Speaker boasts that the Wyoming state budget for the upcoming biennium is lowest in 15 years. University of Wyoming launches new global branding (The World Needs More COWBOYS) and Society follows suit issuing national pronouncement

(The U.S. Needs More BOTANISTS). We gather for 2018 Annual Meeting on the Hams Fork.

2019 Mark Gordon takes office as the thirty-third Governor of State of Wyoming. A current roster of Wyoming endemic plants is heralded in the newsletter as renditions of resilience. Colorado butterfly plant (*Oenothera coloradensis*; formerly *Gaura neomexicana* ssp. *coloradense*) is delisted, removed from Threatened status. A new bundle of online tools (Wyoming Field Guide, Species Tool, Report tool, Map Explorer tool) is rolled out by Wyoming Natural Diversity Database starting in 2019.

2020 RM kicks off the year by marking its 1,000,000th specimen, before the pandemic hits. Society cancels its 2020 annual meeting – for the first time ever. Mullen Fire sets new record for single biggest fire event in Wyoming history (176,878 ac). The Board creates more membership categories, changing member dues for the fourth time in Society history, and the State Budget is cut further.

2021 New Director hired for RM, David Tank. This coincides with Acting Director, Greg Brown, escaping from bureaucratic confines to spend more time in RM. No 2020 U.S. Census report as of yet.

The people of Wyoming Native Plant Society who made everything happen over the years include the list of 51 members who joined in the very first year (May 1981-Jaunuary 1982; below). We hope to see as many founders as possible at the 2021 Annual Meeting. To all members, right up to the present - *THANK YOU!*

First-Year Members	Joined
Ann Aldrich	May-81
Patrick Boles	May-81
Tim Clark and D. Casey	May-81
Francis Current	May-81
Erwin Evert	May-81
Ronald Hartman	May-81
June Haines	May-81
Robert Lichvar	May-81
Dave Martin	May-81
Larry Morse	May-81
Burrell Nelson	May-81
Maribeth Patrick	May-81
Theresa Rooney	May-81
Phyllis Roseberry	May-81

Left: *Oxytropis nana* (Wyoming locoweed) was collected by Thomas Nuttall on his journey across Wyoming in 1834; later a stunning mascot of WYNPS

First-Year Members (continued)	Joined
Marilyn J. Samuel	May-81
Richard Scott	May-81
Don Shute	May-81
Mark Stromberg	May-81
Jennifer Whipple	May-81
Phillip White	May-81
Linda Williamson	May-81
Ray Umber	May-81
Andrew Youngblood	May-81
Don Despain	Aug-81
Robert and Jane Dorn	Aug-81
Keith Dueholm	Aug-81
Scott Finholt	Aug-81
Hugh House	Aug-81
A.L. Mickelson	Aug-81
William Barlow	Oct-81
Michele Barlow	Oct-81
William Brenneman	Oct-81
Karyn Cyrus-Strid	Oct-81
Gael Foenken	Oct-81
Bob Guirgevich	Oct-81
Frances Holbrook	Oct-81
Barry and Joanne Johnston	Oct-81
Katherine Kieffer	Oct-81
John Pearson	Oct-81
Alan Beetle	Jan-82
Lisa Enbretson	Jan-82
Brett Hall	Jan-82
Howard Hunt	Jan-82
Patricia Jackson	Jan-82
Dennis Knight	Jan-82
Lily Mayer	Jan-82
Mariah Associates	Jan-82
Bill Romme	Jan-82
The Nature Conservancy	Jan-82

Growing Native Plants

Part 40. Forbs for Moist, Partly Shaded Sites

By Robert Dorn

Aquilegia coerulea, Colorado Columbine, is a perennial with one to several stems to 2 feet tall and half as wide. The leaves are twice ternately compound with leaflets to 1.3 inches long and nearly as wide. The flowers are usually bicolored with light blue to lavender sepals, white petals and spurs, to 4 inches long and wide, and solitary in the upper leaf axils. They appear mostly in July and August. The plants occur naturally mostly in the shade of aspens or conifers in the mountains. They prefer full shade to part sun and moist, well drained soils. A cool site like a north exposure is best. It can be grown from seed sown outdoors in the fall and barely covered with soil, or cold stratify the seed for at least 60 days for spring planting. Several cultivars are in the nursery trade.

Aquilegia coerulea, Albany County

Arnica cordifolia, Heartleaf Arnica, is a rhizomatous perennial to 2 feet tall and half as wide. The basal leaves are heart shaped, to 4 inches long and wide, and the stem leaves are opposite and narrow. The flower heads are to 4 inches across with yellow ray and disk flowers, 1 or sometimes 2 or 3 at the stem tips. They appear from May to August depending on elevation. The plants occur naturally under aspen or conifers in the mountains. They prefer partial shade and moist, loamy, well drained soil. They can be grown from seed sown as soon as mature and barely covered with soil to allow light exposure. Seed is commercially available. They can also be grown from rootstock divisions.

Arnica cordifolia, Archuleta Co., Colorado

Erigeron speciosus, Aspen Fleabane, is a perennial to 2.5 feet tall and nearly as wide. The leaves are mostly lanceolate to ovate and to 4 or rarely to 6 inches long. The flower heads are to 1.5 inches across with blue, lavender, or pink-purple rays and yellow disk flowers. They are borne at the tips of the many stems. They appear mostly in July and August. The plants occur naturally in open woods and meadows or on cool, moist slopes in the mountains. They prefer part shade to full sun and moist soils. It can be grown from seed surface sown for light exposure. Clumps can also be divided and transplanted.

Erigeron speciosus, San Juan Co., Utah

Lilium philadelphicum, Wood Lily, is a perennial to 2 feet tall and 8 inches wide. The leaves are narrow and to 4 inches long, the upper ones whorled. The flowers are orange to red-orange with a yellowish base with purple spots, to 4 inches across, with 1 to 3 at the stem tips. They appear from June to August. The plants occur naturally in light shade of aspen or pine in the mountains. They prefer partial shade and moist, loamy soil but can tolerate some clay. They can be difficult to grow. Plants grown from seed may take upto 5 years to reach flowering size. Cold stratification of the seed for 30 days or more helps germination. It is easiest to grow from corms planted 4 to 5 inches deep. Do not dig corms in the wild but purchase them from reputable growers. The plants are extremely difficult to transplant.

Lilium philadelphicum,
Lawrence Co., South Dakota

Viola adunca, Hookspur Violet, is a perennial to 4 inches tall and wide. The leaves are near the base, heart shaped, and to 1.25 inches long and nearly as wide. The flowers are blue to purple, to 0.5 inch long, and solitary at the stem tips. They appear from April to August. The plants occur naturally in moist woods and meadows in the mountains. They prefer shade or part sun in cool, moist, loamy soils. They can be grown from seed sown 0.5 inch deep in the fall outdoors. It is also in the nursery trade.

Viola adunca, Pennington Co., South Dakota

To see the above plants in color, go to the newsletter on the Society website.

WYNPS Board – 2021
President: Emma Freeland, Lander (emma.eileen.freeland@gmail.com)
Vice-President: Maggie Eshleman (maggieeshleman@gmail.com)
Sec.-Treasurer: Dorothy Tuthill, Laramie (dtuthill@uwyo.edu)
Board-at-large: Katie Haynes, Laramie (katharine.haynes@usda.gov)(2020-'21)
Paige Wolken, Cheyenne (paigewolken@yahoo.com) (2021-'22)

Other Contacts:
Editor: Bonnie Heidel (bheidel@uwyo.edu)
Webmaster: Emma Freeland (emma.eileen.freeland@gmail.com)
Sublette Chapter: Jill Randall, President (possum1b@yahoo.com)
Teton Plants: Amy Taylor, Treasurer; (tetonplants@gmail.com).
...Check the chapter homepage (https://tetonplants.org/) for events.

Next Issue: Please send articles and announcements by 15 Sept to:
Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073

Left: Whitebark pine
by Ethan Shaw

Upcoming Whitebark Pine Conference

The Whitebark Pine Ecosystem Foundation announces a new date and different way to conduct an international meeting. The Conference: **Research and Management of High Elevation Five Needle Pines in Western North America**, will be held October 5-7. 2021 as a virtual event enabling participants to attend from home or office. Everyone is invited. See the conference website: www.highfivepines.org for details on presenting your paper or poster, becoming a sponsor, and to register for this event.

Social Media: We are on Facebook as Wyoming Native Plant Society and Instagram as @wyomingnativeplantsociety. Follow us on either platform for WYNPS updates and native plant content.

WYOMING NATIVE PLANT SOCIETY MEMBERSHIP FORM

Date _____

Name _____

Address _____

Email _____

Please check all appropriate boxes:

[ ] New member
[ ] Renewing member
[ ] Check here if this an address change
[ ] Annual membership with email notification of newsletters: $10
[ ] Annual membership with mailed newsletters: $12
[ ] Annual membership with scholarship support and email notification of newsletters: $20
[ ] Annual membership with scholarship support and mailed newsletters: $22
[ ] Life membership with email notification of newsletters: $300
[ ] Life membership with mailed newsletters: $300

In addition to the statewide organization, we have two chapters. Membership in chapters is optional; chapter members must also be members of the statewide organization.

[ ] Teton Plants Chapter annual membership: $5
[ ] Sublette Chapter annual membership: $5
[ ] Additional donation of $_____

Total enclosed: _____

Please write checks to **Wyoming Native Plant Society**

Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073